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PRC

PRELIMINARY ASSESSMENT/ VISUAL SITE INSPECTION

KALMUS AND ASSOCIATES, INC
BROADVIEW, ILLINOIS
ILD 005 066 923

FINAL REPORT

Prepared for

U S ENVIRONMENTAL PROTECTION AGENCY
Office of Waste Programs Enforcement
Washington, DC 20460

Work Assignment No	C05087
EPA Region	5
Site No	ILD 005 066 923
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EXECUTIVE SUMMARY

Resource Applications, Inc (RAI) performed a preliminary assessment and visual site inspection (PA/VSI) to identify and assess the existence and likelihood of releases from solid waste management units (SWMU) and other areas of concern (AOC) at the Kalmus and Associates Inc. (Kalmus) facility in Broadview, Illinois This report summarizes the results of the PA/VSI and evaluates the potential for releases of hazardous wastes or hazardous constituents from SWMUs and AOCs identified In addition a completed U S Environmental Protection Agency (EPA) Preliminary Assessment Form (EPA Form 2070 12) is included in Attachment A to assist in prioritization of RCRA facilities for corrective action

The Kalmus facility is located at 2424 South 25th Avenue in Broadview, Illinois The facility is situated in a light industrial/residential area and the site occupies 52,000 square feet (1 2 acres) Prior to 1967 the company was a graphic arts printing operation located at another facility The present facility was constructed in 1967, and since that date Kalmus has been engaged in the manufacture of printed circuit boards The primary wastes generated are alkaline stripping and cleaning solutions (D002) and nickel, copper gold and tin/lead plating wastes (D002 D008, F007) The facility treats its metal wastes in three ion exchange and pH neutralization systems Some treatment sludge is manifested for off site disposal effluent is pH adjusted and discharged to the sanitary sewer Other wastes are also stored indoors for periods of less than 90 days prior to hauling for off site treatment or disposal In 1980, Kalmus protectively filed a RCRA Part A Permit Application, but never engaged in any RCRA treatment storage or disposal activities (i e wastes were never stored for greater than 90 days) For this reason the Part A Permit was withdrawn on April 26 1984 and Kalmus is currently regulated as a generator only There is no evidence of past remedial or removal corrective action at this facility

The PA/VSI identified the following 8 SWMUs at the facility

Solid Waste Management Units

1 Drum Waste Storage Area
2 Memtek Waste Treatment System
3 Tin/Lead Waste Treatment System
4 Gold Waste Treatment System
5 Container Waste Storage Area
6 Satellite Waste Accumulation Areas
7 Resist Stripper Storage Tank
8 Pit Water Storage Tank

No Areas of Concern were identified at the facility

There have been no documented releases from any of the SWMUs, and there is no documented soil contamination at the facility Wastes are stored indoors on sound concrete flooring coated with an alkyd based, acid and alkali proof paint The potential for a release to ground water surface water air or soil is low

Broadview is served by the city of Chicago municipal water supply, whose source is Lake Michigan Thus the community is not dependent upon water from ground water wells Two forest preserves are located within two miles of the facility, and a Veteran's Administration hospital is one mile to the east The nearest residences to the facility are 1000 feet away to the northeast Access to the facility property is unrestricted, the building is locked during non business hours

RAI recommends no further action at this time at the Kalmus facility

1 0 INTRODUCTION

PRC Environmental Management Inc (PRC) received Work Assignment No C05087 from the U S Environmental Protection Agency (EPA) under Contract No 68 W9 0006 (TES 9) to conduct preliminary assessments (PA) and visual site inspections (VSI) of hazardous waste treatment and storage facilities in Region 5 Resource Applications Inc (RAI) TES 9 Team member, provided the necessary assistance to complete the PA/VSI activities for Kalmus and Associates Inc. (Kalmus)

As part of the EPA Region 5 Environmental Priorities Initiative, the RCRA and CERCLA programs are working together to identify and address RCRA facilities that have a high priority for corrective action using applicable RCRA and CERCLA authorities The PA/VSI is the first step in the process of prioritizing facilities for corrective action Through the PA/VSI process enough information is obtained to characterize a facility's actual or potential releases to the environment from solid waste management units (SWMU) and areas of concern (AOC)

A SWMU is defined as any discernible unit at a RCRA facility in which solid wastes have been placed and from which hazardous constituents might migrate, regardless of whether the unit was intended to manage solid or hazardous waste

The SWMU definition includes the following

> RCRA regulated units such as container storage areas tanks surface impoundments waste piles land treatment units, landfills, incinerators and underground injection wells
>
> Closed and abandoned units
>
> Recycling units, wastewater treatment units and other units that EPA has generally exempted from standards applicable to hazardous waste management units
>
> Areas contaminated by routine and systematic releases of wastes or hazardous constituents Such areas might include a wood preservative drippage area, a loading unloading area, or an area where solvent used to wash large parts has continually dripped onto soils

An AOC is defined as any area where a release to the environment of hazardous waste or constituents has occurred or is suspected to have occurred on a nonroutine and nonsystematic basis This includes any area where such a release in the future is judged to be a strong possibility

The purpose of the PA is as follows

Identify SWMUs and AOCs at the facility

Obtain information on the operational history of the facility

Obtain information on releases from any units at the facility

- Identify data gaps and other informational needs to be filled during the VSI

The PA generally includes review of all relevant documents and files located at state offices and at the EPA Region 5 office in Chicago

The purpose of the VSI is as follows

- Identify SWMUs and AOCs not discovered during the PA.

  Identify releases not discovered during the PA.

- Provide a specific description of the environmental setting

  Provide information on release pathways and the potential for releases to each medium

- Confirm information obtained during the PA regarding operations, SWMUs, AOCs and releases

The VSI includes interviewing appropriate facility staff inspecting the entire facility to identify all SWMUs and AOCs, photographing all SWMUs, identifying evidence of releases initially identifying potential sampling locations, and obtaining all information necessary to complete the PA/VSI report

This report documents the results of a PA/VSI of the Kalmus facility (ILD 005 066 923) in Broadview Illinois The PA was completed on May 1, 1991 RAI gathered and reviewed information from the Illinois Environmental Protection Agency (IEPA) and from EPA Region 5 RCRA files RAI also reviewed relevant publications from the U S Department of Agriculture (USDA) U S Geological Survey (USGS), U S Department of Commerce (USDC), Federal Emergency Management Agency (FEMA) and the Illinois State Geological Survey (ISGS)

The VSI was conducted on May 2, 1991 It included interviews with Kalmus facility representatives and a walk through inspection of the facility Eight SWMUs and no AOCs were identified at the facility

RAI completed EPA Form 2070 12 using information gathered during the PA/VSI This form is included in Attachment A. The VSI is summarized and 6 inspection photographs are included in Attachment B Field notes from the VSI are included in Attachment C

2 0 FACILITY DESCRIPTION

This section describes the facility's location, past and present operations (including waste management practices), waste generating processes, release history, regulatory history environmental setting, and receptors

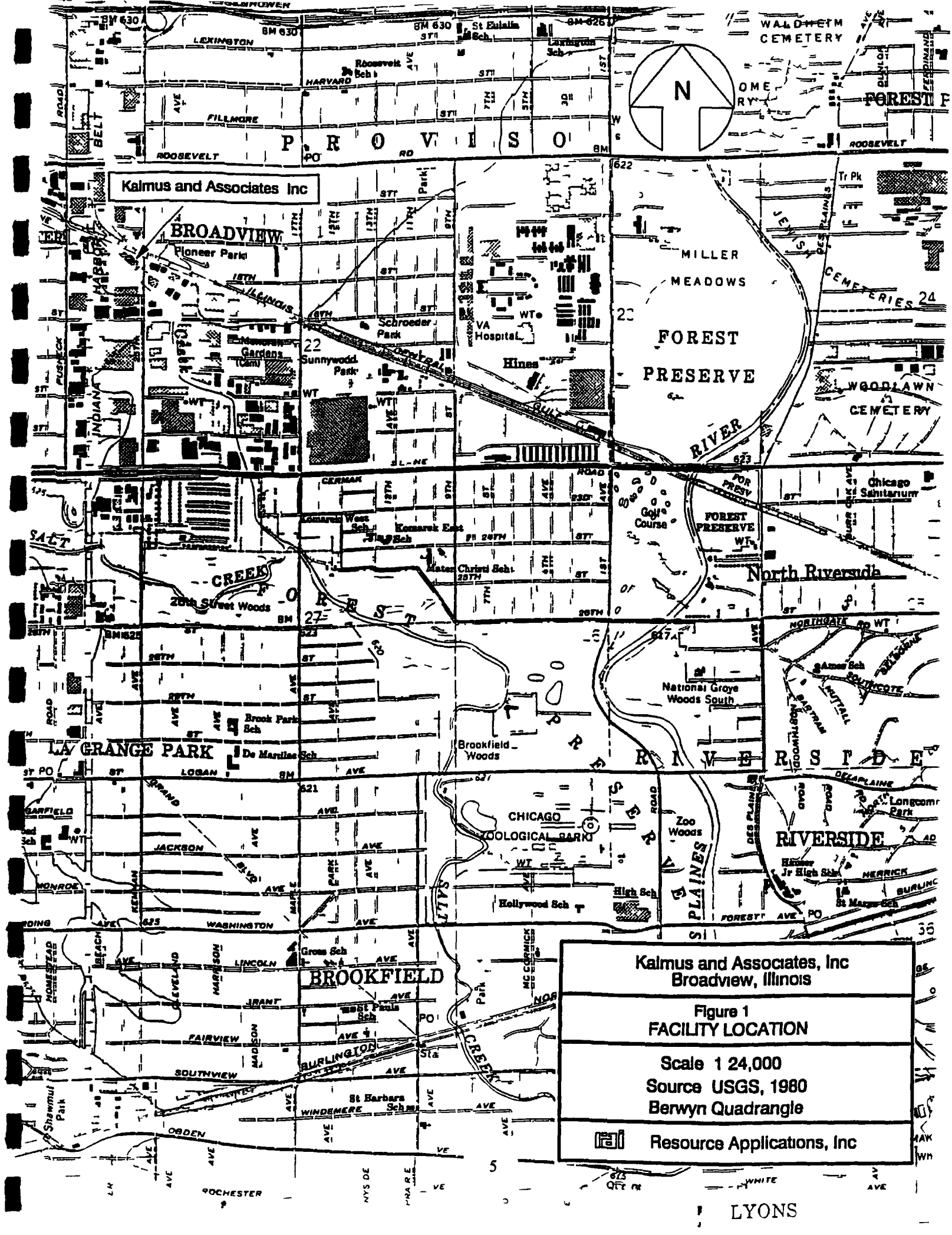
2 1 FACILITY LOCATION

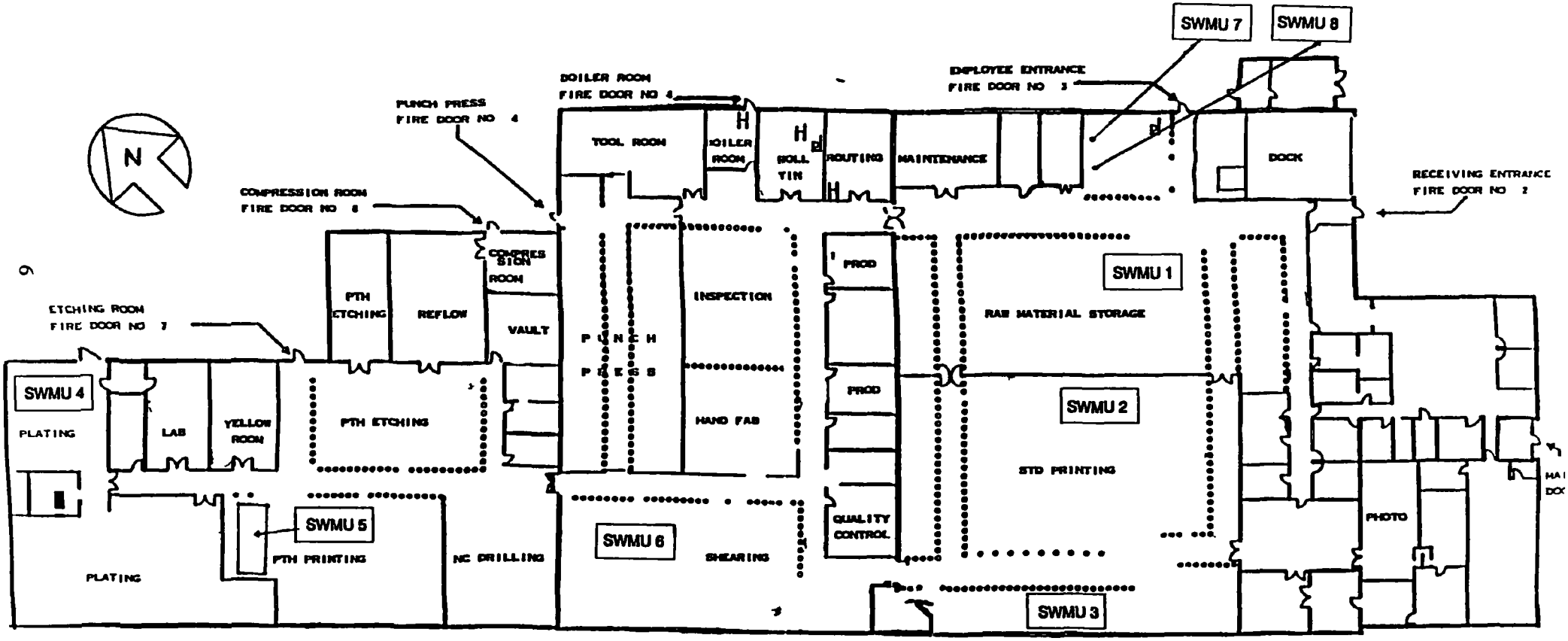
The facility is located at 2424 South 25th Avenue Broadview, Illinois, in Cook County (Latitude 41° 41 27 N Longitude 87° 51 15 W) Broadview is approximately 9 miles west of downtown Chicago and 7 miles northwest of Midway Airport The site is bordered on the north by the Illinois Central Gulf Railroad on the south and west by Addison Creek, and on the east by 25th Avenue (Figure 1) The facility occupies 52,000 square feet, and access to the site is from 25th Avenue The site is located in a light industrial/residential area, the nearest residences are about 1000 feet away to the northeast on the opposite side of the railroad tracks

2 2 FACILITY OPERATIONS

Kalmus and Associates is currently engaged in the manufacture of printed circuit boards The company was established in 1936 as a graphic arts printing operation, specializing in silk screen processing Operation took place at another location prior to 1967 In 1967 Kalmus started generating printed circuit boards, and the graphic arts operation was liquidated over the period 1976 to 1978 The 2424 South 25th Avenue facility was constructed in the years 1965 to 1967, with an addition built from 1970 to 1971 Currently, this Kalmus facility employs 240 people

The three main processes that generate wastes at this Kalmus facility are etching, plating and chemical surface cleaning Most of the waste streams are alkaline or acid solutions (corrosive D002) containing heavy metals used in the plating procedure The waste streams have changed in recent years, due to changes in operations, for instance, copper pyrophosphate solution (D002) is no longer used in the plating bath and methylene chloride (F002) is no longer used for stripping Figure 2 shows the location of the SWMUs at the facility, and Table 1 is a list of the SWMUs Tin/lead, copper, nickel, and gold plating are conducted at the facility Wastes containing metals are mostly processed in one of the ion exchange treatment systems (SWMUs 2, 3, & 4) which unit is used is dependent upon the metal ion(s) present Waste streams that cannot be treated in these systems are accumulated in drums in the Satellite Waste Accumulation Areas in the various departments, and are then stored either in the Drum


Kalmus and Associates Inc
BROADVIEW
Pioneer Park
Schroeder Park
Sunnywood Park
Memorial Gardens (Cem)
PROVISO
MILLER MEADOWS
FOREST PRESERVE
VA Hospital
Hines
WOODLAWN CEMETERY
WALDHEIM CEMETERY
FOREST PRESERVE
Golf Course
Chicago Sanitarium
North Riverside
National Grove Woods South
Brookfield Woods
Zoo Woods
CHICAGO ZOOLOGICAL PARK
RIVERSIDE
LA GRANGE PARK
Brook Park Sch
De Matilas Sch
Hollywood Sch
High Sch
BROOKFIELD
Gross Sch
West Pasla Sch
St Barbara Sch
Longcommon Park
Shawmut Park
SALT CREEK
DES PLAINES RIVER
Kalmus and Associates, Inc
Broadview, Illinois
Figure 1
FACILITY LOCATION
Scale 1 24,000
Source USGS, 1980
Berwyn Quadrangle
Resource Applications, Inc



SWMU 6 consists of a series of satellite accumulation areas located throughout the facility

Kalmus and Associates Inc Broadview Illinois
Figure 2 Facility Layout/SWMU Map
Approximate Scale 1 = 42 Source Kalmus 1987b
Resource Applications Inc

TABLE 1

SOLID WASTE MANAGEMENT UNITS (SWMU)

SWMU Number	SWMU Name	RCRA Hazardous Waste Management Unit*	Status
1	Drum Waste Storage Area	No	Active
2	Memtek Waste Treatment System	No	Active
3	Tin/Lead Waste Treatment System	No	Active
4	Gold Waste Treatment System	No	Active
5	Container Waste Storage Area	No	Active
6	Satellite Waste Accumulation Areas	No	Active
7	Resist Stripper Storage Tank	No	Active
8	Pit Water Storage Tank	No	Active

Note

* A RCRA hazardous waste management unit is one that currently requires or formerly required a RCRA Part A or Part B permit

Waste Storage Area (SWMU 1) or in the Container Waste Storage Area (SWMU 5) Etching pit water (non hazardous) and spent alkaline resist stripper (D002) are pumped into 4,000-gallon tanks The tanks are periodically emptied, and the waste is disposed of off site All hazardous wastes are removed from the facility within 90 days of the start of accumulation

Kalmus has used a number of different companies for waste treatment and/or disposal over the past 10 years Currently Kalmus disposes of its wastes through Envirite Corporation of Harvey, Illinois (Envirite), C P Inorganics of Joliet, Illinois Clean Harbors of Chicago, and Encycle of Texas

2 3 WASTE GENERATING PROCESSES

The facility manufactures printed circuit boards Fiberglass epoxy woven copper clad laminated boards are thoroughly cleaned of all dirt and grease before being plated with copper on both sides Resists are affixed to the board surfaces to produce certain configurations of solder plating The resists are mostly polyacrylic ink films, although tin is used as a resist as well After resist attachment, the boards are solder plated to form the circuit pattern After solder plating, the resists are removed, or stripped from the boards using an alkaline solution Finally the etching process removes excess copper from the board surface There are a number of variations on this general production process, some including nickel and gold plating The waste streams produced at each stage are outlined in detail below and Table 2 lists the solid wastes managed by the facility

The chemical cleaning process involves cleaning of the surface of the boards in order to remove dirt grease and inorganic material The main cleaning agent is a proprietary alkaline solution whose primary constituents are monoethanolamine (MEA) and sodium hydroxide The cleaning bath is at high temperature and thus evaporation requires periodic replenishment with product chemical Surclean 91/92 which is a mixture of hydrochloric acid and ferric chloride, is also used for surface cleaning A phosphonic acid based solution known as 1022 Cleaner is used to remove organic dry film from the surface of the boards before acid copper plating Both Surclean 91/92 and 1022 cleaner are treated in the Memtek Waste Treatment System (SWMU 2), the treatment process is described later in this section

Panels are passed through a scrubbing system, in order to roughen the surface prior to plating The panels are dipped in a 1% sulfuric acid solution, scrubbed with brushes and rinsed Particulate copper is removed from the rinse water using an industrial filter linked to a continuous flow system Five to ten percent of the rinse water is recycled and the remainder is discharged to the sanitary sewer

TABLE 2

SOLID WASTES

Waste/EPA Waste Code	Source	Primary Management Unit
Surclean 91/92/D002	Board cleaning	SWMU 2
1022 Cleaner/D002	Board cleaning	SWMU 2
Sulfuric acid solution/D002	Board scrubbing	SWMU 2
Copper plating solution/D002	Copper plating bath	SWMU 2
Copper plating rinse water/D002	Copper plating line	SWMU 2
Copper cyanide solution/F007	One time generation copper plating (1986)	SWMU 1
Copper pyrophosphate solution/D002	Copper plating bath (prior to 1985)	SWMU 5
Spent nitric acid/D002	Copper stripping from plating racks	SWMU 1
Spent tin/lead fluoroborate plating solution/D002/D008	Tin/lead plating	SWMU 3
Tin/lead plating rinse water/D002/D008	Tin/lead plating	SWMU 3
T strip/D002	Tin resist stripping	SWMU 1
OXIT sludge/D002/D008	Lead salts removal	SWMU 3
Spent resist stripper/D002	Ink resist stripping	SWMUs 6 & 7
Methylene chloride/F002	Resist stripping (no longer used)	SWMU 1
Cupric chloride/D002	PTH etching department (until August 1988)	SWMUs 7 & 8
Ammoniacal copper etching solution/D002	PTH etching department	SWMUs 1 & 6

TABLE 2 (continued)

SOLID WASTES

Waste/EPA Waste Code	Source	Primary Management Unit
Pit water (non hazardous manifested waste)	PTH etching rinse	SWMUs 1, 6 & 8
Spent finishing solution/D002/D008	Solder conditioning	SWMU 1
Spent ammonium persulfate solution/D002	Black oxide line	SWMUs 5 & 6
Spent potassium peroxymonosulfate solution/D002	Black oxide line	SWMUs 5 & 6
Etching rinse water/ D002/D008	Ammonium persulfate etching	SWMU 2
Nickel plating waste/D002	Nickel plating line	SWMU 2
Tin/lead sludge/D002/D008	Tin/lead Waste Treatment System (SWMU 3)	SWMUs 1 & 6
Spent gold cyanide plating solution/F007	Gold plating bath	SWMU 4
Gold cyanide rinse water/F007	Gold plating line	SWMU 4
Gold treatment resin/F007	Gold Waste Treatment System (SWMU 4)	SWMU 1

system The spent sulfuric acid is treated in the Memtek Waste Treatment System (SWMU 2)

The copper plating bath contains a solution of copper sulfate pentahydrate (copper plating solution) Bail out is spent plating solution removed from the bath After plating, the boards are rinsed to remove excess plating solution and the rinse water is known as drag out Both the bail out and the drag out waste streams are treated in the Memtek Waste Treatment System (SWMU 2) A one time generation of copper cyanide solution (F007) occurred in the copper plating department This waste was drummed and stored in the Drum Waste Storage Area (SWMU 1) prior to hauling in July 1986 by Nelson Industrial Services Copper pyrophosphate solution (D002) was used in the plating bath until late 1985, and was generated at an approximate rate of 3,000 gallons per year It was stored in the Container Waste Storage Area (SWMU 6) prior to hauling off site The last manifested shipment for disposal was to Chemical Waste Management in December 1985 Nitric acid is used to strip excess copper from the plating racks Spent nitric acid (D002) is generated at the rate of 3,000 gallons per year, and drummed and stored in the Drum Waste Storage Area (SWMU 1) prior to hauling for disposal by Envirite

After resist attachment, the boards are plated with a tin/lead mixture Two waste streams are produced spent tin and lead fluoroborate plating solution (D002/D008) and drag-out from the rinse tank (D002/D008) Both wastes are treated in the Tin/Lead Waste Treatment System (SWMU 3) After the panels are plated with the tin/lead mixture the plating must be fused to produce solder This is accomplished using an ultra violet oven After exposure in the oven the boards are rinsed and brushed off The resulting effluent is non hazardous containing very small amounts of organics, and is discharged to the sanitary sewer

Removal of the resist material is known as resist stripping Tin resists are removed using ammoniacal hydrogen fluoride or T strip (D002) There is a filter system on the stripping line to remove particulate matter After repeated use the T strip bath becomes contaminated with lead and the spent solution is drummed and stored in the Drum Waste Storage Area (SWMU 1) prior to disposal by Envirite The generation rate has varied over the past few years 18,795 gallons were manifested in 1989 After using T strip, a mixture of nitric and sulfonic acid is used to dissolve insoluble lead salts from the surface of the boards The resulting waste stream is known as OXIT sludge (D002/D008) and is processed in the Tin/Lead Waste Treatment System (SWMU 3)

For stripping of organic ink resists an alkaline solution containing MEA and sodium hydroxide is used Spent resist stripper (D002) is collected in a 55 gallon drum (one of the Satellite Waste

Accumulation Areas SWMU 6) and subsequently pumped into the 4,000-gallon Resist Stripper Storage Tank (SWMU 7) At the time of pickup, the waste is pumped into a tanker truck and hauled by Clean Harbors of Chicago About 20,000 gallons of spent stripper are generated per year Methylene chloride (F002) was formerly used for resist stripping. The amount used decreased considerably as it was being phased out of the manufacturing process In 1989 446 gallons were drummed and stored in the Drum Waste Storage Area (SWMU 1) prior to hauling for treatment by Avganic Industries of Cottage Grove, Wisconsin

The PTH[1] etching department operation involve the dissolution, or etching, of copper from the surface of the circuit boards, in order to produce a certain pattern on the surface or to remove excess copper Cupric chloride solution (manifested as D002) was used for etching until August 1988. When the solution became saturated with copper, it was pumped to one of two 4,000-gallon tanks (now the Resist Stripper Storage Tank (SWMU 7) and the Pit Water Storage Tank (SWMU 8)) From there it was pumped to the dock for removal by C.P Inorganics for reclaiming Approximately 3,000 gallons per month of waste cupric chloride were generated Ammoniacal Copper Etching Solution (D002) is now used as an etchant in the PTH etching department. Spent solution is accumulated in one of the Satellite Waste Accumulation Areas (SWMU 6), and is subsequently drummed and stored in the Drum Waste Storage Area (SWMU 1) prior to hauling by C.P Inorganics for reclaiming. Approximately 2,000 gallons of spent etchant are generated per month The drag-out from the rinse after the ammoniacal etching is known as pit water The waste stream is accumulated in a 55 gallon drum in the etching department, one of the Satellite Waste Accumulation Areas (SWMU 6) When a drum is full, it is moved to a temporary staging area in the Drum Waste Storage Area (SWMU 1) before being pumped into the 4,000-gallon Pit Water Storage Tank (SWMU 8) The waste stream is non hazardous, as the etchant is very dilute and no longer exhibits the characteristic of corrosivity However, Metropolitan Water Reclamation District regulations do not allow its discharge to the sanitary sewer Instead, the pit water is removed in a tanker truck for disposal by Envirite or Clean Harbors of Chicago

After the ammoniacal etching process, the solder is conditioned using a solution of hydrochloric thiourea Approximately 500 gallons of this spent finishing solution (D002/D008) is generated per month, the waste is drummed and stored in the Drum Waste Storage Area (SWMU 1) prior to hauling by Envirite

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[1] PTH is short for plate through hole, a type of circuit board manufactured at this facility Standard (STD) boards are now manufactured at another Kalmus plant

The black oxide line uses an oxidizing agent, sodium chlorate, to oxidize the surface of the copper to promote adhesion on the multilaminated boards The oxidizing bath is maintained at 100°F and consequently, evaporation of the solution occurs The bath is replenished periodically with product sodium chlorate solution Because of the evaporation, there is no need to change or dispose of the bath contents There is a copper micro etching bath on this line as well and ammonium persulfate and potassium peroxymonosulfate (both D002) are the chemicals used Spent solution is accumulated in a 55 gallon drum (one of the Satellite Waste Accumulation Areas SWMU 6) before being moved to the Container Waste Storage Area (SWMU 5) to be transferred into portable containers which are taken to the dock prior to hauling by Envirite About 6,500 gallons of ammonium persulfate waste are generated per month but the rate of generation of potassium peroxymonosulfate is not known Etching rinse water (D002/D008) is treated in the Memtek Waste Treatment System (SWMU 2)

The nickel plating line uses nickel sulfate, boric acid and sulfuric acid The plating bath is at an elevated temperature and evaporation of the solution occurs The bath is replenished by reintroducing concentrated salts from the drag out material Thus very little waste is generated as the bulk of the bath contents is recycled within the process Approximately 55 gallons per year of nickel plating waste (D002) is treated in the Memtek Waste Treatment System (SWMU 2)

Waste solutions containing copper are processed in the Memtek Waste Treatment System (SWMU 2) The system operates on a batch principle and wastewater is piped into a process surge tank from the various departments When a certain volume has accumulated the waste is automatically pumped into an ion exchange column containing synthetic resin beads These beads are sensitive to changes in pH such that when pH is adjusted to a certain value, the metal ions from the solution will be exchanged for hydrogen ions in the resin The pH is adjusted to the desired value by introducing quantities of ammonium hydroxide and sulfuric acid The solution remaining after ion exchange is non hazardous due to the removal of the copper metal ions and is pH adjusted before discharge to the sanitary sewer system The Memtek system processes 40 gallons of wastewater solution per minute Periodically the resin beads become saturated with metal ions and have to be regenerated This is achieved by a process known as electrowinning Sulfuric acid is used to remove the copper ions from the beads producing a copper sulfate solution The copper is electroplated back out of solution to form solid metal, which can be sold for reclaiming After electrowinning, a residual amount of copper remains in the sulfuric acid solution, as not all the copper can be plated out of solution This solution is reintroduced into the front end of the system to pass through pH adjustment and ion exchange in order to reclaim more copper and to neutralize the pH of the solution, which is less than 2 5 after electrowinning In addition to copper, nickel plating waste is treated in this system

The Tin/Lead Waste Treatment System (SWMU 3) works in a similar manner to the Memtek system, except that instead of copper or nickel, tin and lead ions are exchanged for hydrogen ions In order to regenerate the resin, hydrochloric acid is used to bring the metal ions into solution Sodium carbonate is added to the solution in order to precipitate out tin and lead carbonate The resulting precipitate is known as tin/lead sludge (D002/D008), and is accumulated in one of the Satellite Waste Accumulation Areas (SWMU 6) before the 55 gallon drums are moved to the Drum Waste Storage Area (SWMU 1) The waste is hauled by Encycle of Texas, a smelting company that reclaim the metals Approximately 2,000 gallons of tin/lead sludge is generated per year The effluent water is pH adjusted using sodium hydroxide or sodium carbonate and is discharged to the sanitary sewer

The ammonium persulfate etching process is designed to remove copper; however, a small amount of tin and lead is also etched off Thus the etching rinse water treated by the Memtek Waste Treatment System (SWMU 2) contains tin and lead These ions precipitate out as sulfates in the ion exchange column, and this buildup would eventually clog up the resin beads In order to keep the ion exchange process effective, the sulfate waste is backwashed into a 300 gallon tin/lead sulfate dropout tank Here the solution is pH adjusted using sodium carbonate which acts to precipitate the tin and lead as carbonates This tin/lead sludge (D002/D008) is then drummed and stored in one of the Satellite Waste Accumulation Areas (SWMU 6) When a drum is full it is moved to the Drum Waste Storage Area (SWMU 1), and eventually hauled by Encycle of Texas The remaining non hazardous solution is discharged to the sanitary sewer

The gold plating line uses a gold cyanide plating solution The bail-out and drag out waste is treated in the Gold Waste Treatment System (SWMU 4) The resin beads from the ion exchange column are an F007 hazardous waste and are drummed and stored in the Drum Waste Storage Area (SWMU 1) before being sent out for reclamation of the gold metal The effluent is non hazardous due to the removal of gold and cyanide from the solution, and is released to the sanitary sewer after pH neutralization The quantity of gold treatment resin produced is very small, none has been manifested in the past two years This is because the small volume of gold plating waste produced means that the resin in the ion exchange column does not become saturated very quickly

The facility s laboratory uses very small quantities of acetone for ionic contamination procedure tests A solvent system is also used to clean printing screens The main solvents used are di n butyl pthalate, xylene, toluene, butyl carbitol, methanol and isopropyl alcohol About 50 gallons of solvents are used per month The waste streams are diluted in water during the cleaning process, and are further diluted by the total facility effluent prior to discharge into the sanitary sewer system Thus the

waste streams from this department are non hazardous by the time they reach the sewer system due to the dilution of the solvents, although the discharge to the sanitary sewer is monitored for Total Toxic Organics (TTO) by the Metropolitan Water Reclamation District

2 4 RELEASE HISTORY

No evidence of fire, explosion or release of hazardous constituents has been documented at the Kalmus facility

2 5 REGULATORY HISTORY

Kalmus filed a Notification of Hazardous Waste Activity on August 18, 1980 (Kalmus 1980a) and a RCRA Part A Permit Application on November 19, 1980 (Kalmus, 1980b), designating the company as a generator and a treatment, storage and disposal (TSD) facility Wastes with the RCRA codes F001, F002, F003, F005, F006, F007, F008 F009 and D002 were registered as being generated at the facility Four process codes were filed on the application S01 for 14,000 gallons of container storage, S02 for 12,000 gallons of tank storage, T01 for a treatment tank with a capacity of 50,000 gallons per day; and S03 for a 500-cubic yard waste pile An annual total of 1 595 tons of hazardous wastes was estimated as being generated It is not known whether any of the units proposed in the Part A Permit Application are current SWMUs

On August 21, 1981, an IEPA inspection was conducted by Mary Schroeder (IEPA, 1981), and a March 8, 1982 Compliance Inquiry Letter (CIL) from Kenneth Bechely, IEPA to Kalmus outlines 4 violations discovered during the inspection (IEPA, 1982) The facility had failed to 1) indicate the name of the designated permitted facility on certain manifests, 2) label hazardous waste drums with the start of accumulation date, 3) keep records of personnel training, and 4) develop a Contingency Plan It is not known from the files whether these violations were resolved

On October 14, 1983, Christopher E Kalmus of Kalmus wrote to EPA Region 5 to request withdrawal of TSD status due to the fact that the facility had never engaged in TSD activity, that is wastes were never stored for greater then 90 days (Kalmus, 1983) On April 26, 1984 EPA informed Kalmus that it (Kalmus) did not require a RCRA Part A Permit and as of that date were regulated solely as a generator storing hazardous wastes for periods of less than 90 days (EPA, 1984) The facility was never required to undergo formal RCRA closure On June 14, 1984, Donald L. Gimbel of IEPA wrote to William H Miner of EPA to request withdrawal of a referral to EPA for enforcement action

under a 1982 RCRA Compliance Order due to fact that Kalmus was a generator only (IEPA, 1984) It is not possible to determine, from the files, the violations for which the Compliance Order was issued nor is there a copy of the Order on file

On March 19 and April 17, 1987, John Maher of IEPA conducted inspections at the Kalmus facility In the Inspection Report (IEPA, 1987a), it is noted that the S01, S02 and T01 units registered on the Part A application were never actually used for TSD activities (i e waste was never stored for more than 90 days) As a result of the inspection, however, a CIL was sent to Henry Kalmus on May 11, 1987, outlining the following violations 1) Kalmus had not determined if the salt residue from the roll tin operation was a hazardous waste, 2) hazardous wastes were being stored in open containers, 3) weekly inspections of tanks and containers were not being conducted as required, 4) some 300-gallon containers and one 55 gallon drum had no start-of accumulation dates marked on them, 5) most 55 gallon drums did not have the words Hazardous Waste marked on them, 6) personnel training and records of such training were inadequate, 7) the facility's Contingency Plan was not detailed enough 8) the satellite accumulation areas were not being managed properly, in that some containers were open, some were not identified as containing hazardous wastes, and satellite accumulation was not being limited to 55 gallons, 9) no copies existed of certain signed manifests, 10) there was inadequate aisle space throughout the facility; 11) no arrangements had been made with the local emergency organizations, and 12) no emergency coordinator had been appointed (IEPA, 1987b) On May 26, 1987, Henry Kalmus Jr replied, scheduling dates for compliance (Kalmus, 1987a) A follow up inspection was conducted by John Maher of IEPA on July 13, 1987, only 1 violation was found to have been resolved (IEPA, 1987c) On August 21, 1987, Mayda I Block of Kalmus sent a copy of the Contingency Plan to John Maher (Kalmus 1987b), this resolved a number of the remaining violations A subsequent follow up inspection on September 24, 1987 found the facility to be operating in full compliance, with all violations resolved (IEPA, 1987d) The facility was notified of this finding in a November 24, 1987 letter (IEPA, 1987e) On October 8, 1987, Kalmus refiled a Notification of Hazardous Waste Activity to reflect their change in status to a generator only (Kalmus, 1987c)

Kalmus does not hold any NPDES permits for this facility There are no air permits on file at IEPA for the facility, and there is no record of any remedial or corrective activity at the site

2 6 ENVIRONMENTAL SETTING

This section describes the climate, flood plain and surface water, geology and soils, and ground water in the vicinity of the Kalmus facility

2 6 1 Climate

The Kalmus site is located just off Interstate 290 on 25th Avenue in Broadview, Illinois It is approximately 7 miles northwest of Midway Airport the location of the nearest U S National Weather Service office With no significant topographical barriers to airmass flow, the climate in the area is typically continental with cold winters, warm summers, and frequent short period fluctuations in temperature humidity, cloudiness, and wind direction (Ruffner, 1985) The average annual daily temperature is 49 9°F while the lowest average monthly minimum temperature of 17 4°F occurs in January and the highest average monthly maximum temperature of 81 0°F occurs in July The prevailing wind direction is from the west, and the average wind speed is 10 4 miles per hour Average annual precipitation, as a water equivalent is 34 44 inches Average annual net precipitation is 4 44 inches (USDC, 1968) In winter about one half of the precipitation (10 percent of the annual total) falls as snow During the fall winter, and spring, the pattern of precipitation tends to be more uniform both over time and distance whereas in summer, rainfall is often locally heavy and variable The 1 year 24-hour maximum rainfall recorded in the area over a 34 year period is 6 24 inches (Ruffner and Bair, 1985)

2 6 2 Flood Plain and Surface Water

The facility is at an approximate elevation of 625 feet above mean sea level It is situated adjacent to Addison Creek, which joins Salt Creek about 1 mile to the south Salt Creek joins the Des Plaines River about 3 miles to the southwest The Des Plaines River is 2 miles from the facility at its closest point The site locale is classified as a Zone C flood plain area that is an area of minimal flooding outside the 500 year flood plain (FEMA, 1981)

2 6 3 Geology and Soils

Surface features in the Chicago area are largely the result of glaciation and almost completely cover the underlying bedrock surface (Willman 1971) The facility is underlain by a soil complex known as Urban land Markham Ashkum Urban land comprises more than 75 percent of this complex and

consists of soils that have been cut graded, and filled and that are obscured by buildings and pavements The Markham soil series consists of deep, moderately well drained soils with moderate to low permeability It consists of a thin layer of silty material and an underlying silty clay loam glacial till The Ashkum series consists of deep, poorly drained soils with moderate to low permeability It consists of a thin layer of silty material and an underlying silty clay loam till The Ashkum soils occur in low lying areas on till plains or moraines, while the Markham soils occur more frequently in upland areas Water carrying capacity and permeability varies from location to location as a result of construction activity Run off is medium to very rapid depending on the percentage of slope (USDA, 1979)

Soils in the Chicago area have developed over the past 13,500 years through weathering of the immediately underlying glacial deposits left behind for the most part, by retreating Wisconsin age glaciers In the vicinity of the site these glacial deposits take the form of a gray clayey till containing pebble and smaller sized black shale particles Approximately 100 feet of till overlie the uppermost bedrock unit of the Silurian age Formations in the Chicago area of Silurian age are almost entirely dolomite, whose composition ranges from extremely argillaceous silty and cherty to exceptionally pure In the vicinity of the site, it is about 250 feet thick Beneath the Silurian dolomite are successively older rocks of Ordovician and Cambrian age Within each of these two systems are distinctive sandstone formations which serve as major aquifer systems in the Chicago area The base of the Cambrian is in contact with the crystalline pre Cambrian basement at an inferred depth of 4 000 feet (Willman 1971)

2 6 4 Ground Water

Ground water is obtained from four major aquifer systems in northeastern Illinois the glacial drift system, the shallow bedrock system and two deep bedrock systems They are distinguished by their hydrologic properties and recharge source areas (Hughes et al , 1966) In central Cook County, the glacial drift is thin, and sand and gravel deposits are correspondingly thin or absent Here shallow deposits are mainly fine grained or silty and virtually all drilled wells penetrate solid bedrock for ground water supplies (Bergstrom et al , 1955) The shallow bedrock aquifer system in the vicinity of site underlies the glacial drift system and is comprised of the Silurian dolomite formations and underlying late Ordovician shales The upper boundary of this system is the top of the bedrock, and the lower boundary is the top of a sequence of formations of middle Ordovician age called the Galena Platteville Dolomite Water from this aquifer is obtained from fractures and solution openings in the Silurian dolomite beds As a result, individual well yields vary widely depending upon the water volume present

in the drilled openings Recharge is attained by percolation of local precipitation through the overlying glacial drift and/or permeable materials within the drift sequence itself (Hughes et al 1966) The shallow bedrock system can serve as a source for domestic, industrial, and municipal water supplies Private wells usually obtain water from the upper 15 feet to 75 feet of the dolomite, while wells serving municipalities and industries generally penetrate 50 feet to 250 feet into the dolomite (Bergstrom et al 1955)

The deep bedrock aquifer systems include the Cambrian Ordovician aquifer system and the Mt Simon aquifer system The former is comprised of the Glenwood and St Peter Foundations of the middle Ordovician series and the Ironton and Galesville Sandstone Formations of the late Cambrian The top of the Cambrian Ordovician aquifer is at the top of or within the Galena Platteville Dolomite, which serves as the lower boundary for the shallow bedrock aquifer system In the site locale the contact between the Galena Platteville Formations and the Glenwood Formation occurs at a depth of about 800 feet below the ground surface The bottom of the Cambrian Ordovician aquifer system is located in the impermeable shales and dolomites of the upper and middle parts of the Cambrian Eau Claire Formation, at a depth of about 1,400 feet below the ground surface Thus this aquifer system spans a thickness of 600 feet (Hughes et al , 1966)

Within the Cambrian Ordovician aquifer system the Glenwood St Peter sandstone unit is widely utilized as an aquifer where water requirements are less than 200 gallons per minute (gpm) This unit has a permeability of approximately 15 gallons per day per square foot (gpd/sq ft) The Ironton Galesville sandstone unit is the major ground water producing unit in the Cambrian Ordovician aquifer because it has the most consistent permeability (35 gpd/sq ft) and thickness (200 ft) of the aquifers in northeastern Illinois (Hughes et al ,1966)

Recharge to the Cambrian Ordovician aquifer system is mostly from western McHenry, Kane and Kendall Counties where the rocks crop out at the surface or lie immediately below the glacial drift Additional recharge occurs directly from leakage of precipitation downward through the shallow bedrock aquifer system Ground water is not a source of drinking water in this area

The second deep bedrock aquifer system the Mt Simon aquifer is bounded above by the relatively impermeable shales and dolomites of the upper and middle parts of the Eau Claire Formation and below by the crystalline pre Cambrian basement With the Eau Claire Formation units functioning as an aquitard water in the Mt Simon aquifer is about 1,750 feet beneath the ground surface Although the Mt Simon Sandstone is nearly 2 000 feet thick only the uppermost 275 feet of sandstone

yield potable water because below that depth, the water is too highly mineralized for most purposes (Hughes et al 1966) The average permeability of the Mt Simon aquifer system is approximately 16 gpd/sq ft (Hughes et al, 1966) and recharge is largely from the outcrop region of Cambrian rocks in central southern Wisconsin (Willman 1971) The general direction of ground water flow in the vicinity of the site is from west to east (i e towards the Des Plaines River)

2 7 RECEPTORS

The facility is located in a light industrial/residential area, the nearest residences are about 1000 feet away to the northeast, on the opposite side of the Illinois Central Gulf Railroad The population of Broadview is approximately 9,000 Access to the facility is unrestricted other than that the building is locked during non business hours

The City of Broadview receives its water from the City of Chicago municipal water system, the source for which is Lake Michigan Thus the community is not dependent upon water from ground water wells According to the Broadview Department of Public Works (BDPW), there are no water wells within 2 miles of the facility (BDPW, 1991) The nearest surface water is Addison Creek, which is directly to the south, adjacent to the facility The possibility of human ingestion of contaminated water from the site is minimal There are forest preserves 1 mile to the south of the site (adjacent to Salt Creek) and 2 miles to the east (adjacent to the Des Plaines River) A Veterans s Administration hospital is located approximately 1 mile east of the facility

3.0 SOLID WASTE MANAGEMENT UNITS

This section describes the 8 SWMUs identified during the PA/VSI The following information is presented for each SWMU description of the unit dates of operation, wastes managed release controls history of release, and RAI observations

SWMU 1	**Drum Waste Storage Area**
Unit Description	This unit is composed of 2 rectangular areas with dimensions of 23 ft by 15 ft and 15 ft by 11 ft, forming an L-shaped area in the northeast section of the facility (Figure 2, Photo 1) It is used to store 55 gallon drums of hazardous and non hazardous wastes Drums are mainly stored on wooden pallets, although some drums of pit water waste were observed to be placed directly on the concrete floor
Date of Startup	1967
Date of Closure	Currently operating
Wastes Managed	Copper cyanide solution (F007) one time generation hauled July 1986 Spent nitric acid (D002) T Strip (D002) Methylene chloride (F002) formerly used for resist stripping Ammoniacal copper etching solution (D002) Pit water (non hazardous manifested waste) Spent finishing solution (D002/D008) Tin/lead sludge (D002/D008) Spent gold ion exchange resin (F007)
Release Controls	The concrete floor is coated with an alkyd based, impermeable alkali and acid proof paint The drums are stored on wooden pallets There are no floor drains in the vicinity of the storage area
History of Release	There has been no documented release from this unit
Observations	The drums are in good condition, and are clearly labelled

SWMU 2	**Memtek Waste Treatment System**
Unit Description	This unit is an ion exchange pH adjustment system manufactured by Memtek (Figure 2, Photos 2 3 & 4) It is used to reclaim metal ions from waste solutions and to render the remaining liquid non hazardous The process by which the wastewater is treated is detailed in Section 2 3 The capacity of the system is 40 gallons per minute The process surge tank (Photo 2) and backwash tank (Photo 4) are polypropylene, the ion exchange column tanks are fiberglass (Photo 3), as are the pH adjustment tanks
Date of Startup	August 1989
Date of Closure	Currently operating
Wastes Managed	Surclean 91/92 (F002) 1022 Cleaner (D002) Copper plating solution (D002) Copper plating rinse water (D002) Etching rinse water (D002/D008) Nickel plating waste (D002)
Release Controls	The concrete floor is coated with an alkyd based impermeable alkali and acid proof paint
History of Release	There has been no documented release from this unit
Observations	The system is relatively new and in good condition
SWMU 3	**Tin/Lead Waste Treatment System**
Unit Description	This unit is a system used mainly to treat wastes from the tin/lead (solder) plating process (Figure 2) Waste solutions are introduced to the system and tin and lead ions are exchanged into the resin Hydrochloric acid is used as a regenerant for the resin, bringing the metal ions back into solution The pH is adjusted using sodium

	carbonate, in order that tin and lead carbonate precipitate out of solution These carbonate precipitates form part of the tin/lead sludge waste stream, and are drummed and stored in the Drum Waste Storage Area (SWMU 1) prior to hauling The effluent is pH adjusted using sodium carbonate or sodium hydroxide prior to discharge to the sanitary sewer
Date of Startup	1976
Date of Closure	Currently operating
Wastes Managed	Spent tin/lead fluoroborate plating solution (D002/D008) Tin/lead plating rinse water (D002/D008) OXIT sludge (D002/D008)
Release Controls	The concrete floor is coated with an alkyd based, impermeable alkali and acid proof paint
History of Release	There has been no documented release from this unit
Observations	The unit and surrounding floor are in good condition
SWMU 4	**Gold Waste Treatment System**
Unit Description	This unit is similar to the Memtek system in that resin beads are used to capture metal ions from waste solutions It is located in the gold plating room (Figure 2) This unit is designed solely for gold recovery When the resin beads are saturated they are drummed and sent off site for reclaiming of the gold metal
Date of Startup	1976
Date of Closure	Currently operating
Wastes Managed	Spent gold cyanide plating bath solution (F007) Gold cyanide rinse water (F007)

Release Controls	The concrete floor is coated with an alkyd based, impermeable alkali and acid proof paint
History of Release	There has been no documented release from this unit
Observations	The unit and surrounding floor are in good condition
SWMU 5	**Container Waste Storage Area**
Unit Description	This is an area in the southwest corner of the facility used for the storage of large containers of hazardous wastes (Figure 2, Photo 5) These containers are manufactured from polypropylene with a metal frame and have capacities of 300 to 500 gallons They are mobile and are transported to the dock area prior to hauling
Date of Startup	1967
Date of Closure	Currently operating
Wastes Managed	Spent ammonium persulfate solution (D002) Spent potassium peroxymonosulfate solution (D002) Copper pyrophosphate solution (D002)
Release Controls	The concrete floor is coated with an alkyd based, impermeable alkali and acid proof paint
History of Release	There has been no documented release from this unit
Observations	The floor around the containers is in good condition, and all the containers are clearly marked

SWMU 6	**Satellite Waste Accumulation Areas**
Unit Description	Several of the departments accumulate their waste in a 55 gallon drum The areas in which the accumulation drums are placed are known as satellite accumulation areas (Figure 1, Photo 6) When a drum is filled with waste, it is moved either to the Drum Waste Storage Area (SWMU 1) to await pickup, to one of the storage tanks (SWMUs 7 & 8), or to the Container Waste Storage Area (SWMU 5) These satellite units are present in areas throughout the facility, including the etching department, near the Tin/Lead Waste Treatment System (SWMU 3), and adjacent to the PTH etching department
Date of Startup	1967
Date of Closure	Currently operating
Wastes Managed	Spent resist stripper (D002) Ammoniacal copper etching solution (D002) Pit water (non hazardous manifested waste) Spent ammonium persulfate solution (D002) Spent potassium peroxymonosulfate etchant (D002) Tin/lead sludge (D008/D002)
Release Controls	The drums are stored either on wooden pallets or directly on the concrete floor, which is coated with an alkyd based, impermeable alkali and acid proof paint
History of Release	There has been no documented release from these units
Observations	The drums are in good condition and have lids
SWMU 7	**Resist Stripper Storage Tank**
Unit Description	This is a 4,000 gallon stainless steel tank with a lining of a DuPont polymer known as Kynar It is used to store spent alkaline resist stripper, whose main constituents are monoethanolamine and sodium

	hydroxide The tank is located in the northeast section of the facility immediately to the west of the dock area (Figure 2) Prior to 1988, the tank was used to store waste cupric chloride etching solution
Date of Startup	1967
Date of Closure	Currently operating
Wastes Managed	Spent resist stripper (D002)
Release Controls	The concrete floor is coated with an alkyd based, impermeable alkali and acid proof paint
History of Release	There has been no documented release from this unit
Observations	The tank is in good condition
SWMU 8	**Pit Water Storage Tank**
Unit Description	This is a 4 000 gallon stainless steel tank with a lining of DuPont Kynar It is used to store pit water, which is rinse water from the ammoniacal etching process The tank is located in the northeast section of the facility, immediately to the west of the dock area (Figure 2) It is adjacent to the Resist Stripper Storage Tank (SWMU 7) Prior to 1988 the tank was used to store waste cupric chloride etching solution
Date of Startup	1967
Date of Closure	Currently operating
Wastes Managed	Pit water (a non hazardous manifested waste)
Release Controls	The concrete floor is coated with an alkyd based, impermeable alkali and acid proof paint

History of Release	There has been no documented release from this unit
Observations	The tank is in good condition

4.0 AREAS OF CONCERN

RAI identified no AOCs during the PA/VSI

5 0 CONCLUSIONS AND RECOMMENDATIONS

The PA/VSI identified 8 SWMUs and no AOCs at the Kalmus facility Background information on the facility s location operations, waste generating processes, release history, regulatory history, environmental setting, and receptors is presented in Section 2 0 SWMU specific information, such as the unit s description, dates of operation, wastes managed, release controls, release history, and observed condition is discussed in Section 3 0 AOCs are discussed in Section 4 0 Following are RAI s conclusions and recommendations for each SWMU Table 3 identifies the SWMUs at the Kalmus facility and suggested further actions

SWMU 1	**Drum Waste Storage Area**
Conclusions	This is an area used to store 55 gallon drums of hazardous and non hazardous wastes The concrete floor is sound and is covered in an alkyd based paint The drums are stacked on pallets The potential for release to ground water surface water, air or soil is low as the unit is located indoors
Recommendations	No further action is recommended at this time
SWMU 2	**Memtek Waste Treatment System**
Conclusions	This system is used to treat waste solutions containing copper and nickel All wastes are monitored and automatically pH adjusted before discharge to the sanitary sewer There is no secondary containment but the unit is located indoors on a sound concrete floor and is in good condition Therefore the potential for release to ground water, surface water air or soil is considered low
Recommendations	No further action is recommended at this time
SWMU 3	**Tin/Lead Waste Treatment System**
Conclusions	This system is used to treat waste solutions containing tin and lead All wastes are monitored and automatically pH adjusted before discharge to the sanitary sewer There is no secondary containment but the unit is located indoors on a

TABLE 3

SWMU AND AOC SUMMARY

SWMU	Operational Dates	Evidence of Release	Suggested Further Action
1 Drum Waste Storage Area	1967 to present	None	No further action is recommended at this time
2 Memtek Waste Treatment System	1989 to present	None	No further action is recommended at this time
3 Tin/lead Waste Treatment System	1976 to present	None	No further action is recommended at this time
4 Gold Waste Treatment System	1976 to present	None	No further action is recommended at this time
5 Container Waste Storage Area	1967 to present	None	No further action is recommended at this time
6 Satellite Waste Accumulation Areas	1967 to present	None	No further action is recommended at this time
7 Resist Stripper Storage Tank	1967 to present	None	No further action is recommended at this time
8 Pit Water Storage Tank	1967 to present	None	No further action is recommended at this time

	sound concrete floor and is in good condition Therefore, the potential for release to ground water, surface water, air or soil is considered low
Recommendations	No further action is recommended at this time
SWMU 4	**Gold Waste Treatment System**
Conclusions	This system is used to treat gold plating line wastes All effluent is monitored and automatically pH adjusted before discharge to the sanitary sewer Treatment sludge is manifested for off site reclamation There is no secondary containment but the unit is located indoors on a sound concrete floor and is in good condition Therefore the potential for release to ground water surface water, air or soil is considered low
Recommendations	No further action is recommended at this time
SWMU 5	**Container Waste Storage Area**
Conclusions	This unit is used to store 300 to 500 gallon capacity containers of hazardous wastes It is located indoors on a sound concrete floor All containers are in good condition Therefore, the potential for release to ground water surface water air or soil is considered low
Recommendations	No further action is recommended at this time
SWMU 6	**Satellite Waste Accumulation Areas**
Conclusions	These areas consist of 55 gallon drums used to accumulate wastes at or near the points of generation The drums have lids and are in good condition They are stored on pallets The potential for release to ground water, surface water air or soil is considered low
Recommendations	No further action is recommended at this time

SWMU 7	**Resist Stripper Storage Tank**
Conclusions	This is a 4,000 gallon tank used to store spent alkaline resist stripper It is constructed of stainless steel and is in good condition There is no secondary containment but the unit is located indoors on a sound concrete floor Therefore the potential for release to ground water surface water, air or soil is considered low
Recommendations	No further action is recommended at this time
SWMU 8	**Pit Water Storage Tank**
Conclusions	This is a 4,000 gallon tank used to store non hazardous etching pit water It is constructed of stainless steel and is in good condition There is no secondary containment but the unit is located indoors on a sound concrete floor Therefore, the potential for release to ground water, surface water, air or soil is considered low
Recommendations	No further action is recommended at this time

REFERENCES

Bergstrom, R E J W Foster L.F Selkregg, and W A. Pryor, 1955 "Groundwater Possibilities in Northeastern Illinois Illinois State Geological Survey Circular 198, Urbana, Illinois

Broadview Department of Public Works (BDPW), 1991 Telephone conversation between Alan Supple RAI and a Department of Public Works employee, September 11

Environmental Protection Agency (EPA), 1984 Letter to Christopher E. Kalmus from Karl J Klepitsch Jr, April 26

Federal Emergency Management Agency (FEMA), 1981 National Flood Insurance Program Village of Broadview Illinois, Cook County Community panel number 170067 0001 B, January 16

Hughes, G M, P Kraatz, and R A. Landon 1966 Bedrock Aquifers of Northeastern Illinois Illinois State Geological Survey Circular 406, Urbana, Illinois

Illinois Environmental Protection Agency (IEPA) 1981 Inspection Report, August 21

IEPA, 1982 Compliance Inquiry Letter (CIL) to Mr Kalmus from Kenneth Bechley, March 8

IEPA, 1984 Letter to William H Miner, EPA from Donald L. Gimbel, regarding 1982 Compliance Order June 14

IEPA, 1987a Inspection Report March 19 & April 7

IEPA, 1987b CIL to Henry Kalmus from Harry Chappel, May 11

IEPA, 1987c. Follow Up Inspection Report, July 13

IEPA, 1987d Follow Up Inspection Report, September 24

IEPA, 1987e Letter to Mayda Block, Kalmus from Angela Aye Tin November 24

Kalmus and Associates, Inc (Kalmus), 1980a Notification of Hazardous Waste Activity, August 18

Kalmus 1980b RCRA Part A Permit Application, November 19

Kalmus, 1983 Letter addressed to RCRA Activities, EPA Region 5 from Christopher E Kalmus October 14

Kalmus 1987a Letter to Harry Chappel, IEPA from Henry Kalmus, Jr, May 26

Kalmus 1987b Letter to John Maher, IEPA from Mayda I Block enclosing a copy of Kalmus Contingency Plan August 21

Kalmus, 1987c Re filing of Notification of Hazardous Waste Activity, October 8

Ruffner J A. and Frank E Bair, eds, 1985 Weather of U S Cities, vol 1, Gale Research Co, Detroit, Michigan

Ruffner, J A., ed , 1985 Climates of the States, vol 1 Gale Research Co , Detroit, Michigan

U S Department of Agriculture (USDA), 1979 "Soil Survey of DuPage and Part of Cook Counties, Illinois Illinois Agricultural Experiment Station Report No 108

U S Department of Commerce (USDC), 1968 Climatic Atlas of the United States U S Printing Office Washington, D C

U S Geological Survey (USGS), 1980 Berwyn Quadrangle, Illinois Cook County 7 5 minute topographic series

Willman, H B , 1971 Summary of the Geology of the Chicago Area" Illinois State Geological Survey Circular 460 Urbana, Illinois

ATTACHMENT A

EPA PRELIMINARY ASSESSMENT FORM 2070-12

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 SITE INFORMATION AND ASSESSMENT

I IDENTIFICATION

01 STATE	02 SITE NUMBER
IL	ILD 005 066 923

II SITE NAME AND LOCATION

01 SITE NAME (Legal common or descriptive name of site)	02 STREET ROUTE NO OR SPECIFIC LOCATION IDENTIFIER				
Kalmus and Associates Inc	2424 South 25th Avenue				
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 COUNTY**	**07 COUNTY CODE**	**08 CONG DIST**
Broadview	IL	60153	Cook		

09 COORDINATES LATITUDE 41 41 27 N | LONGITUDE 087 51 15 W

10 DIRECTIONS TO SITE *(Starting from nearest public road)*

This site is located on South 25th Street just south of the Illinois Central Gulf Railroad tracks It is approximately 1 mile south of the Eisenhower Expressway (Interstate 290)

III RESPONSIBLE PARTIES

01 OWNER *(If known)*	02 STREET *(Business, mailing residential)*		
Kalmus and Associates Inc	2424 South 25th Street		
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 TELEPHONE NUMBER**
Broadview	IL	60153	(708) 343-7004
07 OPERATOR *(If known and different from owner)*	**08 STREET** *(Business, mailing residential)*		
Kalmus and Associates Inc	2424 South 25th Street		
09 CITY	**10 STATE**	**11 ZIP CODE**	**12 TELEPHONE NUMBER**
Broadview	IL	60153	(708) 343-7004

13 TYPE OF OWNERSHIP *(Check one)*

■ A PRIVATE □ B FEDERAL _____ *(Agency name)* □ C STATE □ D COUNTY □ E MUNICIPAL

□ F OTHER _____ *(Specify)* □ G UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE *(Check all that apply)*

■ A RCRA 3010 DATE RECEIVED 08 / 18 / 80 (MONTH DAY YEAR) □ B UNCONTROLLED WASTE SITE *(CERCLA 103 c)* DATE RECEIVED / / (MONTH DAY YEAR) □ C NONE

IV CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION

■ YES DATE 05 / 02 / 91
□ NO

BY *(Check all that apply)*

□ A EPA ■ B EPA CONTRACTOR □ C STATE □ D OTHER CONTRACTOR
□ E LOCAL HEALTH OFFICIAL □ F OTHER _____ *(Specify)*

CONTRACTOR NAME(S) Resource Applications, Inc

02 SITE STATUS *(Check one)*

■ A ACTIVE □ B INACTIVE □ C UNKNOWN

03 YEARS OF OPERATION

1967 (BEGINNING YEAR) | Present (ENDING YEAR) □ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT KNOWN OR ALLEGED

Copper sulfate pentahydrate Surclean 91/92 1022 Cleaner nitric acid tin/lead fluoroborate T-strip (ammoniacal hydrogen fluoride) sulfuric acid resist stripper (monoethanolamine sodium hydroxide) ammoniacal copper etching solution finishing solution (hydrochloric thiourea) ammonium persulfate potassium peroxymonosulfate tin/lead treatment sludge gold plating solution (gold potassium cyanide) boric acid sulfuric acid gold treatment resin

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

All operations at the facility are located indoors The potential for a significant release affecting the environment or surrounding population is low

V PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION *(Check one. If high or medium is checked complete Part 2 Waste Information and Part 3 Description of Hazardous Conditions and Incidents.)*

□ A HIGH *(Inspection required promptly)* □ B MEDIUM *(Inspection required)* ■ C LOW *(Inspect on time-available basis)* □ D NONE *(No further action needed complete current disposition form)*

VI INFORMATION AVAILABLE FROM

01 CONTACT	02 OF *(Agency/Organization)*			03 TELEPHONE NUMBER
Kevin Pierard	U S EPA			(312) 886 4448
04 PERSON RESPONSIBLE FOR ASSESSMENT	**05 AGENCY**	**06 ORGANIZATION**	**07 TELEPHONE NUMBER**	**08 DATE**
Jeff Indeck		Resource Applications Inc	(312) 332 2230	09 / 24 / 91 (MONTH DAY YEAR)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 WASTE INFORMATION

I IDENTIFICATION	
01 STATE	02 SITE NUMBER
IL	ILD 005 066 923

II WASTE STATES QUANTITIES AND CHARACTERISTICS

01 PHYSICAL STATES *(Check all that apply)*

- ☐ A SOLID
- ☐ B POWDER FINES
- ■ C SLUDGE
- ☐ D OTHER _____ *(Specify)*
- ☐ E SLURRY
- ■ F LIQUID
- ☐ G GAS

02 WASTE QUANTITY AT SITE *(Measures of waste quantities must be independent)*

TON _____

CUBIC YARDS _____

NO OF DRUMS 75 (approx.)

03 WASTE CHARACTERISTICS *(Check all that apply)*

- ■ A TOXIC
- ■ B CORROSIVE
- ☐ C RADIOACTIVE
- ☐ D PERSISTENT
- ☐ E SOLUBLE
- ☐ F INFECTIOUS
- ☐ G FLAMMABLE
- ☐ H IGNITABLE
- ☐ I HIGHLY VOLATILE
- ☐ J EXPLOSIVE
- ■ K REACTIVE
- ☐ L INCOMPATIBLE
- ☐ M NOT APPLICABLE

III WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	2 000	gallons/year	Tin/lead treatment sludge
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS	105 800	Gallons/year	Stripping and etching agents contain heavy metals
BAS	BASES	44 000	Gallons/year	Resist stripper and etching solution
MES	HEAVY METALS			

IV HAZARDOUS SUBSTANCES *(See Appendix for most frequently cited CAS Numbers)*

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
	Nitric Acid	7697 37 2	Drummed/hauled off site		
	Ammoniacal Hydrogen Fluoride	1341 49 7	Drummed/hauled off site		
	Ammoniacal Copper Etching Soln		Drummed/hauled off site		
	Hydrochloric Thiourea		Drummed/hauled off site		
	Ammonium Persulfate		Stored in containers/hauled		
	Potassium Peroxymonosulfate		Stored in containers/hauled		
	Tin/Lead Sludge	SEQ 56 1	Drummed/hauled off site		
	Gold Treatment Resin		Drummed/hauled off site		

V FEEDSTOCKS *(See Appendix for CAS Numbers)*

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI SOURCES OF INFORMATION *(Cite specific references e g state files sample analysis reports)*

Illinois Environmental Protection Agency (IEPA) 1980 1990 Compliance and Inspection Files
Conversation with Greg Bopp Associate Engineer Kalmus & Associates during Visual Site Inspection May 2 1991 and subsequent telephone conversations

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I IDENTIFICATION	
01 STATE	02 SITE NUMBER
IL	ILD 005 066 923

II HAZARDOUS CONDITIONS AND INCIDENTS

01 ■ A GROUNDWATER CONTAMINATION — 02 □ OBSERVED (DATE _____) — ■ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

Low potential for release to ground water All operations are located inside a building

01 ■ B SURFACE WATER CONTAMINATION — 02 □ OBSERVED (DATE _____) — ■ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

Low potential for release to surface water All operations are located inside a building

01 ■ C CONTAMINATION OF AIR — 02 □ OBSERVED (DATE _____) — ■ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

Low potential for release to air All operations are located inside a building

01 □ D FIRE/EXPLOSIVE CONDITIONS — 02 □ OBSERVED (DATE _____) — □ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

None identified

01 ■ E DIRECT CONTACT — 02 □ OBSERVED (DATE _____) — ■ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

Low potential for direct contact All operations are located inside a building that is locked after hours

01 ■ F CONTAMINATION OF SOIL — 02 □ OBSERVED (DATE _____) — ■ POTENTIAL — □ ALLEGED

03 AREA POTENTIALLY AFFECTED _____ (Acres) — 04 NARRATIVE DESCRIPTION

Low potential for release to soil All operations are located inside a building

01 □ G DRINKING WATER CONTAMINATION — 02 □ OBSERVED (DATE _____) — □ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

None identified

01 ■ H WORKER EXPOSURE/INJURY — 02 □ OBSERVED (DATE _____) — ■ POTENTIAL — □ ALLEGED

03 WORKERS POTENTIALLY AFFECTED 240 — 04 NARRATIVE DESCRIPTION

Acids and bases are in open baths on the plating lines thus there is a possibility that workers could be splashed with corrosive liquids

01 ■ I POPULATION EXPOSURE/INJURY — 02 □ OBSERVED (DATE _____) — ■ POTENTIAL — □ ALLEGED

03 POPULATION POTENTIALLY AFFECTED >40,000 — 04 NARRATIVE DESCRIPTION

Low potential for population exposure/injury All operations are located inside a building that is locked after hours

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I IDENTIFICATION	
01 STATE	02 SITE NUMBER
IL	ILD 005 066 923

II HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE _____) — ☐ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION

None identified

01 ☐ K DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE _____) — ☐ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION (Include name(s) of species)

None identified

01 ☐ L CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE _____) — ☐ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION

None identified

01 ☐ M UNSTABLE CONTAINMENT OF WASTES — 02 ☐ OBSERVED (DATE _____) — ☐ POTENTIAL — ☐ ALLEGED

03 POPULATION POTENTIALLY AFFECTED _____ — 04 NARRATIVE DESCRIPTION

None identified

01 ☐ N DAMAGE TO OFF-SITE PROPERTY — 02 ☐ OBSERVED (DATE _____) — ☐ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION

None identified

01 ☐ O CONTAMINATION OF SEWERS STORM DRAINS WWTPS — ☐ OBSERVED (DATE _____) — ☐ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION

None identified

01 ☐ P ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE _____) — ☐ POTENTIAL — ☐ ALLEGED

04 NARRATIVE DESCRIPTION

None identified

05 DESCRIPTION OF ANY OTHER KNOWN POTENTIAL, OR ALLEGED HAZARDS

None identified

III TOTAL POPULATION POTENTIALLY AFFECTED ___

IV COMMENTS

Low potential for release from the 8 SWMUs

V SOURCES OF INFORMATION *(Cite specific references e g state files sample analysis reports)*

Visual Site Inspection May 2 1991

ATTACHMENT B

VISUAL SITE INSPECTION SUMMARY AND PHOTOGRAPH LOG

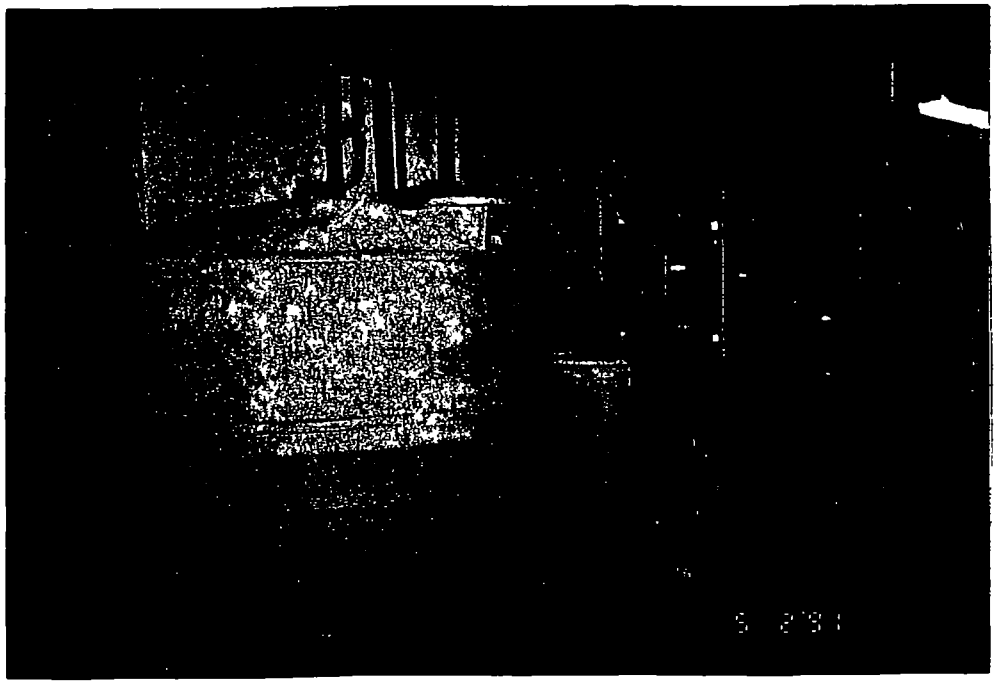
VISUAL SITE INSPECTION SUMMARY

Kalmus and Associates Inc.
2424 S 25th Avenue
Broadview, Illinois

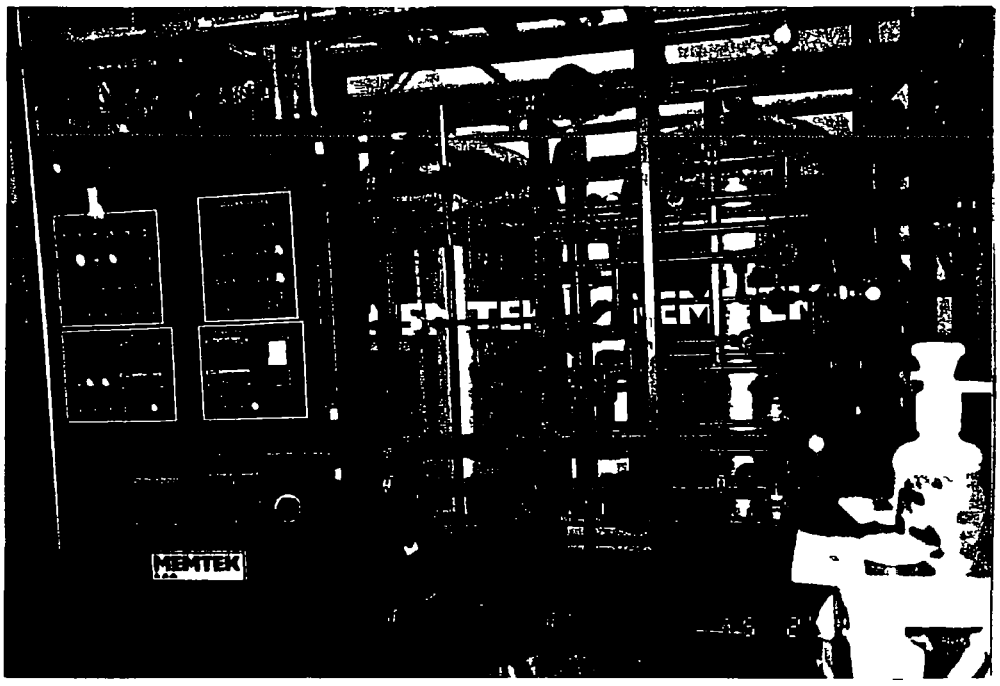
ILD 005 066 923

Date	May 2, 1991
Facility Representatives	Greg Bopp, Associate Engineer Gerry Golembiewski, Vice President, Manufacturing Frank R Popp, Sr, Plant Manager
Inspection Team	Jeff Indeck, RAI Amy Sapp, RAI
Photographer	Amy Sapp, RAI
Weather Conditions	Clear, 80°F
Summary of Activities	RAI conducted a VSI at the facility The inspection commenced at 9 00 A.M The VSI consisted of walking through the facility, observing current and past waste management areas Interviews with plant personnel were also conducted The waste streams generated at the facility are properly managed and no problems were observed The VSI was concluded at 3 00 P M

Photograph No 1 **Location SWMU 1**
Orientation East **Date. 05/02/91**
Description This area stores 55-gallon drums of hazardous and non-hazardous wastes Drums are stored on wooden pallets The floor is coated with an alkyd based, acid- and alkali proof paint.



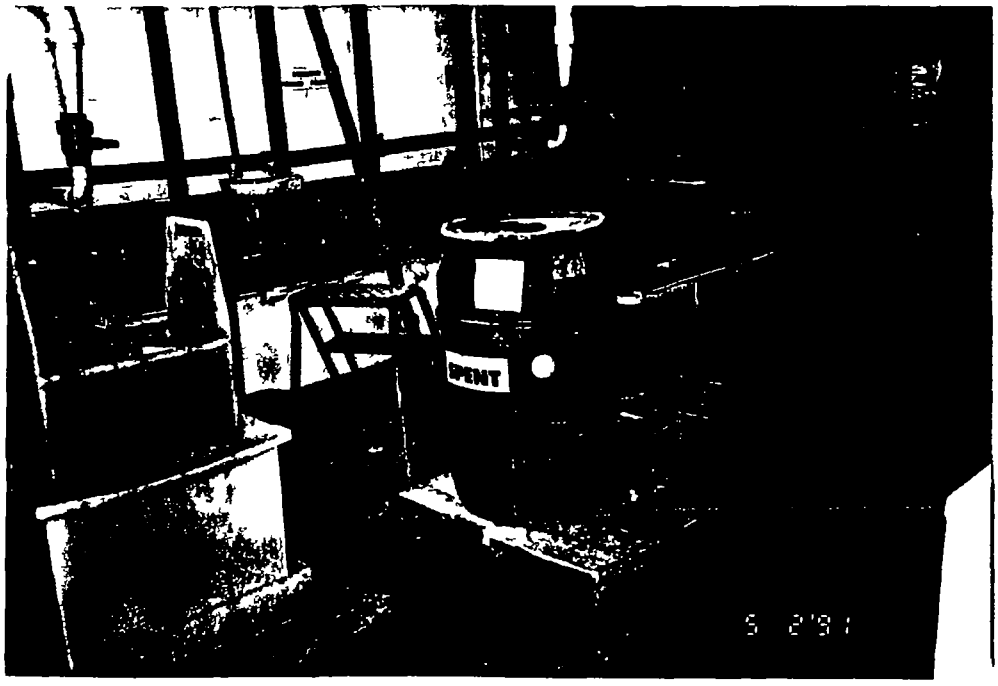
Photograph No 2 **Location SWMU 2**
Orientation North **Date 05/02/91**
Description This is the process surge tank for the Memtek Waste Treatment System Waste water is pumped in, and when a certain level is reached, the waste is pumped to the ion exchange column



Photograph No 3 **Location SWMU 2**
Orientation Northeast **Date. 05/02/91**
Description These are the ion exchange columns for the Memtek Waste Treatment System Waste is pumped in from the process surge tank.

Photograph No 4 **Location SWMU 2**
Orientation East **Date. 05/02/91**
Description This is the backwash tank from the ion exchange columns of the Memtek System Tin/lead waste is removed from this tank by precipitating the metal ions out as carbonates

Photograph No 5 **Location SWMU 5**
Orientation Southwest **Date 05/02/91**
Description These are the portable containers used to store spent ammonium persulfate and potassium peroxymonosulfate etchants They have metal frames, and are moved to the dock area prior to hauling



Photograph No 6 **Location SWMU 6**
Orientation East **Date 05/02/91**
Description This is one of the Satellite Waste Accumulation Areas located in the copper micro-plate department This drum is accumulating spent resist stripper

ATTACHMENT C

VISUAL SITE INSPECTION FIELD NOTES

Dump is locked
Haz Waste is stored between yellow tape. There is fencing around it w/ a padlock. product is also stored here

25 Satellite Accumulation Area

Aff's camera =

4,5,6 3 pictures of satellite accum
7 1 outdoor storage area

8 2 sets of 3 1500 gal settling tanks

Leonard Gustafson - Maintenance

front half (W) of building built 1966
back half and tanks built 1974

Kalmus & Assoc VSI 5/2/91

Jeff Madsen - Army Supp, EHS
Greg Bopp, K+A Assoc Engineer
Frank Popp K+A Plant Mgr
Jerry Grotembrewski K+A, VP

Main facility is now reg as a generator. Satellite facility has been sold (maybe 1984). (Closed in 1985
Who used to store and equipment
Facility keeps a copy of the report and an assessment of our findings.

Facility built 1965 - 67 and 70-71
Kalmus was a graphic (silk screening) company. Attached boards in 1967
Graphics ceased 1976 - 1978
Still do printing but only for circuit boards

Processes at Facility

Etching Copper

Plating Copper

Chem Surface Cleaning

Solder & Gold Plating

Fabrication

WASTE STREAMS

(corrosive) [illegible] copper

3.0 gal port Ammonium Persulfate - reduced by 80%

4000 gal Tank Cupric Chloride - no longer used

Copper Pyrophosphate - subst Copper Sulfate

Drummed Ammoniacal Copper Sol'n - still used

Methylene Chloride - eliminated

Nitric Acid - still used

- Ammoniacal Copper Etchant
  - CP Inorganics - (Total reclaim)
- Cupric Chloride - no longer used
- Methylene Chloride no longer used
- Potassium peroxy-mono sulfate replaced ammonium persulfate

Copper Sulfate

Synthetic ion exchange resin (deep gold plating)

Technic (reclaimed)

haven't manifested this in 2 yrs

(1/2 cu ft per 3 yrs)

sold back for reclaim

not corrosive

Cupric Chloride Etching Process

Containment Trough used to contain rinses from cleaning etchant which we called Cupric Chloride Pit Waste

No longer use this but the [illegible] still

- Finishing solution - cleans the copper [illegible] (cured [illegible] on board)
- Ammonium hydrogen fluoride - still used
  a/k/a ammonium bi-fluoride
- Ammoniacal Hydrogen Pit waste (was D008 on EE inspection)

No longer considered a haz waste (stored in bulk & shipped out). Changed process so this is no longer hazardous

- Cyanide Solution (Gold Cyanide) generated very infrequently (once in 2 yrs) was related to GOLD [illegible]

- Copper Cyanide
  - a one-time generation in 1986

Tin + Lead Sludge (Tin + Lead Carbonate)
Still used
related to solder plating
Encycle Texas
Tin/Lead Fluoroborate
boards are rinsed in drag-out tank - rinse the boards, get bal out waste
process has been changed
add sodium carbonate to a produce Tin + Lead Carbonate
Supernatant is flushed to sewer

- Waste alkaline stripper
  still produced
  Waste solder stripper - no longer produced
  = Ammonium hydrogen fluoride solution (T-Strip)
  Combined 2 processes, so there's only one waste now
  Sur clean 91 ~~and~~ 92
  Hydrochloric ~~Nitric~~ Acid + Ferric Chloride
  still used, treated in house
  2 yrs ago installed ion exchange system

OxIT Sludge (a liquid) generated and treated in-house No longer manifested out

Roll Tin operations ceased Aug 89

They reconfigured the facility in 1989 to make things more efficient

There is a second facility on 27th Ave

1,1,1 TCA no longer used

Photo 1 - Product Storage
Photo 2 - Spent pt water
- could use anything to store
4 - 55 gal drum/day

Polyurethane coating on top
Solder with is kept nearby

"Spent" - Storage for Haz waste
1021 cleaner
Tris Phosphoric Acid
after Copper Plating plating boards are cleaned of this

1022 Cleaner is in-House
treated
* T-Strip = Stored in drums
* transferred to vacuum tanker
in the Dark
Photo 3-4 Haz Wst Drum Storage
Fluoroboric Acid
SurClean
Etchant = Ammonium Hydroxide Etch
* Nitric Acid 11 drums
Carbon Bail out
Bail out — Electrostrip
Copper Mix — Tin Strip
Lead Sludge D008
Nitric Acid Salt (Ppt w/ Nitric Acid [illegible])
Save up les skids (2 week? 8 days?)
or 90 days
there are haz waste labels on EVERY
drum
Screen Wash Room —
Create & Reclaim screens
Monitored for TTO, but never
a problem. Washes go to
sewer

Process
Start w/ insulator coated
w/ copper. Put image on it
then [illegible] unwanted copper.
Other processes for multi layer
(coat w/ BLACK Oxide)
Solder mask

[illegible] Scrubber —
Dip boards w/ 1% sulfuric acid
then water [illegible] through
[illegible] [illegible] [illegible] [illegible]
is put through filter press

Rinse
15 [illegible] 80
[illegible] [illegible] sulfuric [illegible] [illegible] [illegible]
copper cleaning process
Drain to sewer line — [illegible]
Concrete is etched
down
Photo 5 — etched floor

Stripping room =
generate resist stripper
strip the etch resist film off
the boards — they change the
stripper @ every 2000 panels
but there's sludge here — they
run the material through
a press and the solid
material is filtered out

Multi layer laminator
laminates the [illegible] for the
oven used to cure resin or drive
off water
pH ~~conmonitor~~ monitor in this room
(reading 8.6 now) is hooked
up to Frank's office

Die press room

Photo 7 — Hydraulic fluid collecting
behind a [illegible]

Photo 8 former [illegible] storage
stripped names & Mary '81

5-8 250 gal drums of Fred
transferred to tank when
2 [illegible] used in a
copper plating that is
no longer there (moloney [illegible]
[illegible])

[illegible] Degreasing stripping area
for Tin Lead strip

used to [illegible] 1,1,1 —
there is epoxy build up on floor
Solvent storage [illegible]

Etching Machine — Copper Plating
[illegible] Solder Plating
Sump for waste water
Tied to waste treatment
system — all sol'n [illegible]
[illegible] lead
Sump — lead containing
solutions

lead soln is sent through
resin exchange ex pass

photo 13
in treatment tank, drop out
lead as lead hydroxide

1/5th volume is sludge (1/L)

11:15 expand KCl dropout

2 Tanks are Bleed Tanks w/
Diaphragm Pumps
→ 2000 gal surge tank
→ Ion Exchange System

+ change copper + lead ions

change oxygen reduction potential
from 11 to 1+

25 gal/min
bag filter
to pH adjust tank
adjust to 4

using oxydation reduction potential
break down

Drum filters
filter press used by water/silica
tin lead sludge for
incineration

photo 15
Spent resin strip sludge
stored/collected next to
plating line

photo 16
Tank of lead outfall
tin & lead going into system
are turned into sulfates
in the ion exchange column
and put in column.
The batch waste of water is 3500
gallon tank then into another
tank

Then pH adjust the material to get lead + tin surface to [illegible] out the 2nd barrel contains water of Copper

The Tin + Lead goes into the Tin Lead sludge

Recipe for resist stripper bath
110° F
75 gal DI water
10 gal R.S. Bow (1%)
1 qt Foamer
bring to a certain level/volume with DI water

Printing Area
Solvent disposed of on rags and disposed of in [illegible] using [illegible] or [illegible]

Methylene Chloride - stripped using it [illegible] [illegible]

---

48 Etch
[illegible] persulfate in [illegible] on [illegible]

[illegible]
18 [illegible] → [illegible]
[illegible]

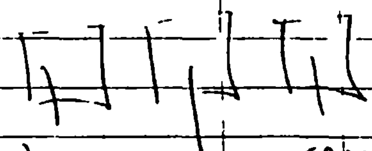
Yellow room -
some things are sensitive to UV light
put resist film on the boards

[illegible]
[illegible] of [illegible] [illegible] water

[illegible]
[illegible] of the [illegible] water

Photo 22
[illegible] storage
the [illegible] pallet of drums need to [illegible] them

Reflow –
Changing tin/Lead into solder by heating a up. Use flux to prevent oxidation Closed system.



deburr fuser scrub

flux goes down sewer
'thermal transmission fluid.

T/L Sludge Generation –
Photo 23

Lab –
Used, contaminated plating baths are held in 55-gal drums in lab area then shipped through [illegible]

Gold room –
Gold plating line
Copper treat [illegible] [illegible]
[illegible]
[illegible] [illegible] $[illegible]

Removes tin [illegible] coating
[illegible] over floor –
liquid on floor goes to sewer
use T [illegible] + [illegible].

Potassium Cyanide (spent)
[illegible] under a drain.
– [illegible] for [illegible]
[illegible] [illegible].

Lead Tin and Copper
not contaminated plating lines
come to [illegible] cleaner waste
[illegible] [illegible] Copper Clean [illegible]
other waste is Ammonia persulfate
[illegible] plating lines [illegible]
[illegible] [illegible] [illegible]
generate this sludge

Generate Sun Clean

Copper Mix Bucket Waste
is stored here.

Sun Clean changed every 2 mo.

2 tanks
#2 - pH water
#1 Resist Stripper
[illegible]

If [illegible] KVL needs [illegible]
permit

Document Needs
Contingency Plan
Spill Permits
MSDS for KVL Cleaner

Kalmus and Associates

81 - Storage facility on Cresent Drive
+ Sold Equip & Sold Building 84/85?

Building 65 Addition 67 70? Addition
Company 55 years old - Elsewhere
Graphic Arts Printing Op
67 Started generating Boards
Printing on plastics/paper Used inks
Silkscreening Processing orig
All printing dedicated to Circuit Board
76-78 Liquidated Graphic Arts

AP < 80%
Copper Pyro Rep Copp Sulphate

Potassium Oxidizer - Corrosive ? copper
Replaces most AP K peroxymonosulfate
K persulfate
Amm Copper - Reclaimed by Cu Inorganic
MC - no
Treatment Gold - Techni - Sent for Reclain
Done by vendor of Gold salts
Not a Sludge
Synthetic Ion Xchange Resin
15 cu ft out / 2-3 years Dehydrate & Sh
Not hazardous

Containment PIT on CUPRIC CHLORIDE
Reclaimed as copper ~~chlo~~ oxide
Containment still exists

Finish Solutions Clean off Copper solution/c
after cleaning

Ammonium Hydrogen Fluoride = Ammon Bifluori

Alum Etch Pit Waste - Non haz waste
Process change - reduce constituents
Stored in bulk, shipped out as non haz

Cyanide Sola - generate as Gold CN
Copper CN - One time generation

Tin/lead Related to solder operations

Drag out / Bail out Tin/lead Sl/sde
PUT IN TREATMENT TIN CANS / LEAD CANS
Sent to recycle TEXAS
Sewer supernatant
Change in Process waste minimization

Waste Alkaline Stripper
Waste Solder Stripper
Ammonia hydroxide used instead
Waste min Same

T Strip - Tin lead strip - Solder

SURCLEAN 91
Nitric Acid Ferric Chloride
Treated in House

Only Sludge not Sludge is Liquid
Gen but Treated in House
Not manifested out
Used to be pH adjusted
Our system Treats effectively since 2 years

Roll Tin ops no longer done on Site
Not since August 89

SUPCLEAN - DEPLENISHES BUT NOT CLEANED OUT

MOST WASTE & PRODUCT IN STORAGE

SATELLITE STORAGE ADJACENT TO PRODUCT

3 TIMES LEAK — PIT WATER - NON HAZ

SOUTH ASH — ALL MATERIALS COULD BE STORED HERE

NILZ block flow — MIGHT / DAY DROP OFF

4 x 55 GAL DRUM / DAY — SINCE 76-78

POLYURETHANE COATING ON FLOOR

X — DOCK PRODUCT IN AND OUT

DRUMS STORE FOR RETURN TO VENDOR

ACCESS IN/OUT

HAS CONTAINMENT

PH ADJUSTMENT & AMM HYDROXIDE & SULFR ACID

AGAINST ~~OUT~~ WALL HEAT DOCK

T STRIP - TANKER OUT

AMM HYA FLUORIDE

PUMPED OUT BY VACUUM TRUCK AT DOCK

AMM HYDROXIDE ETCH

CP MORE

PUT INTO DRUMS DRUMMED AWAY FOR RECLAIM

RINSH WELL -

TANKER OUT

Nitric Acids
Low Volume ≈ 12 Drums
Pump to Tanker
to Envirite for waste delisting
As liquid have salts from same process
Solid salts from sludge
Returned to Sold as ≤ 10% solids dur
vacuum removal

T Strip
Oxit
1022 cleaner
Tin Strip
Cu mix Bail out
≈ 55 g/yr Electro strip HCl strip from Gold Une
Fluoboric Acids
Lead/Tin RO Haz sludge
Tin/Lead Bail out

Copper mix non Haz Particulate copper - Dry
some Formaldehyde

Granular Carbon & copper not haz
to clean of organics from bath -

IMAGE ON BOARD SUBSTRAT
Black oxide use to promote adhesion
INSULATE C Copper on both sides

IMAGE on PLATE DRY OR —

FILTER CAKE - LANDFILLED in 99 9% DIATOM EAH
Non Haz
Roger DEDICATED TO FILTER
CLEANING PROCESS AMMON PERSULFATE
Copper Line
DRAIN TO SEWER IS ETCHED
PROB 15 YEARS OLD
DRAIN IS SEALED

RESIST STRIPPER OFF LINE
LEFT IN 4,000 TANK FOR STORAGE
DRUMMED & MOVED TO TANK
PUMPED TO STORE TANK
TANKERED
FILTER C PARTICULATE MANIFESTED AS SOLID

pH monitor / USED AS PROCESS CONTROL

Punch Press - not a generator

Drilling Area - Has containment of pigs & Cu
Bucket ≥ vol in machine
Trans Fluid

OCB Ammonium Sulfate Area ①
May 99 Switch
From copper cleaner oxide Remover

Tin/Lead Sludge Decant Staging area
Drums on SKID

Solvent Storage
Depresser floor
Vented

Main Plating System
Keep copper & lead Separate
lead kept into 2nd ancillary tract
PH & Carb adjusted
Settled out

Storage in 55 gal drums
Tin Sulfate

Treat Ion or pH

- Bleed Tanks
  Ion Exchange

- Pos charge metal ions

Membrane Treatment System
Filters to incinerate

Resist Strip Storage ≈ 1/2 months
Excess Store On-Line
Outside Berm
No Sewers

Black Oxide Line - Has containment Dike

Tin & Lead sludge is generated in several places
Copper decanted off, back to system

Air Venting System in main Plate Room
- Monitor by County for IEPA
- 2nd is Mentek

- Methyl Chloride cease - 2/89 removed 4/89

- No solvent Reclamation on Site

UV PRINTING - Generates no material inkon

Back plating Room gens 748 ETCH
AP now K mono
Since 87 and before 78?
Tanker out at dock

PIT WATER / AMMONIACAL ETCH / Finish Soln
Stored in ETCHING Room. (OUTSIDE ET
Daily product
Sump in Floor
4 Drums Between ETCH & Reflow

Reflow Room - Flux
Asbestos
No waste
Vent to Stack
Scrubber

- Labs -
- Most chems return to vat/line
- Return to system for treat
Not leaving facility

Plating
Finger plating nickel
T-strip
Gold plating

Carbon treat tanks
450 gals / 375
Whole room is pit + rinsewater to sewer

Pre Copper Clean Line
1022
748 etch

Solder Plating
Drag out / Tin Lead
Sur Clean 91/92

---

2 tanks Pit Water Resist Strip
4100 gals A year of

Dock - Sump to MemTek pH adjust
Can shut down system, Drain 500 gal
tote from sump

Photos - Send them copies
Ask EPA of DL
Crescent Site